

What is claimed is:

1. A device comprising :
a substrate with a device region;
5 a cap for encapsulating the device, the cap creates
a cavity over the device region; and
spacer particles fixed to a surface of the device
region to support the cap.
- 10 2. The device of claim 1 wherein the device region
comprises one or more cells.
3. The device of claim 2 wherein the spacer particles
comprise a non-conductive material.
- 15 4. The device of claim 3 wherein the spacer particles
are coated with a layer of adhesive.
5. The device of claim 4 wherein the adhesive layer
20 comprises thermal curable material.
6. The device of claim 4 wherein the adhesive layer
comprises ultraviolet curable material.

7. The device of claim 4 wherein the adhesive layer comprises hot melt material.

8. The device of claim 1 wherein the spacer particles are coated with a layer of adhesive.

9. The device of claim 8 wherein the adhesive layer comprises thermal curable material.

10. The device of claim 8 wherein the adhesive layer comprises ultraviolet curable material.

11. The device of claim 8 wherein the adhesive layer comprises hot melt material.

12. The device of claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 or 11 wherein the spacer particles are randomly distributed in the device region, occupying both active and non-active regions.

13. The device of claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 or 11 wherein the spacer particles are randomly distributed in the device region, selectively occupying non-active regions.

14. The device of claim 12 wherein the spacer particles comprise a spherical shape.

15. The device of claim 14 wherein the spacer particles
5 comprises a mean diameter to maintain a height of the cavity between the cap and substrate.

16. The device of claim 15 wherein the spacer particles
10 comprise a density to maintain the cavity.

17. The device of claim 16 wherein the density of the spacer particles is about 10 - 1000 No/mm².

18. The device of claim 12 wherein the spacer particles
15 comprise a non-spherical shape.

19. The device of claim 18 wherein the spacer particles comprise different shapes.

20 20. The device of claim 19 wherein the spacer particles comprises a mean diameter to maintain a height of the cavity between the cap and substrate.

21. The device of claim 20 wherein the spacer particles comprise a density to maintain the cavity.

22. The device of claim 21 wherein the density of the
5 spacer particles is about $10 - 1000 \text{ No/mm}^2$.

23. The device of claim 22 wherein the spacer particles comprises a mean diameter to maintain a height of the
10 cavity between the cap and substrate.

24. The device of claim 13 wherein the spacer particles comprise a spherical shape.

25. The device of claim 24 wherein the spacer particles
15 comprises a mean diameter to maintain a height of the cavity between the cap and substrate.

26. The device of claim 25 wherein the spacer particles comprise a density to maintain the cavity.

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27. The device of claim 26 wherein the density of the spacer particles is about $10 - 1000 \text{ No/mm}^2$.

28. The device of claim 13 wherein the spacer particles comprise a non-spherical shape.

29. The device of claim 28 wherein the spacer particles
5 comprise different shapes.

30. The device of claim 29 wherein the spacer particles comprises a mean diameter to maintain a height of the cavity between the cap and substrate.

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31. The device of claim 30 wherein the spacer particles comprise a density to maintain the cavity.

32. The device of claim 31 wherein the density of the
15 spacer particles is about $10 - 1000 \text{ No/mm}^2$.

33. The device of claim 32 wherein the spacer particles comprises a mean diameter to maintain a height of the cavity between the cap and substrate.

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34. A method for forming a device comprising:
providing a substrate with a device region;
applying a layer of adhesive on spacer particles;
depositing the spacer particles on the substrate;

curing the layer of adhesive on the spacer particles; and

mounting a cap on the substrate to encapsulate the device, the cap forms a cavity in the device region
5 supported by spacer particles.

35. The method of claim 34 wherein the device comprises an OLED device.

10 36. The method of claim 35 wherein the substrate is prepared with a conductive layer patterned to form first electrodes and at least one organic functional layer over the conductive layer.

15 37. The method of claim 36 wherein the spacer particles comprise a non-conductive material.

38. The method of claim 37 wherein the adhesive comprises thermal curable material.

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39. The device of claim 37 wherein the adhesive comprises ultraviolet curable material.

40. The device of claim 37 wherein the adhesive comprises hot melt material.

41. The method of claim 37 wherein depositing the
5 spacer layers comprises dry spraying.

42. The method of claim 41 wherein coverage of the spacer particles on the substrate is patterned by photolithography technology.

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43. The method of claim 41 wherein coverage of the spacer particles on the substrate is patterned by dry resist technology.

15 44. The method of claim 41 wherein coverage of the spacer particles on the substrate is patterned by shadow mask technology.

45. The method of claim 41 wherein the dry spraying
20 comprises:

electrostatically charging the substrate with a first polarity and the spacer particles with a second polarity; and

blowing the spacer particles against the substrate
with dry air.

46. The method of claim 45 wherein the dry air
5 comprises a dew point of $\leq 58^{\circ}\text{C}$.

47. The method of claim 46 wherein coverage of the
spacer particles on the substrate is patterned by
photolithography technology.

10 48. The method of claim 46 wherein coverage of the
spacer particles on the substrate is patterned by dry
resist technology.

15 49. The method of claim 46 wherein coverage of the
spacer particles on the substrate is patterned by shadow
mask technology.

50. The method of claim 37 wherein depositing the
20 spacer particles comprises wet spraying.

51. The method of claim 50 wherein the wet spraying
comprises:

Suspending spacer particles in a solution; and

Spraying the solution with spacer particles on the substrate.

52. The method of claim 51 wherein the solution
5 comprises a concentration of spacer particles of about
0.1 - 0.5 weight percent.

53. The method of claim 52 wherein coverage of the
spacer particles on the substrate is patterned by
10 photolithography technology.

54. The method of claim 52 wherein coverage of the
spacer particles on the substrate is patterned by dry
resist technology.

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55. The method of claim 52 wherein coverage of the
spacer particles on the substrate is patterned by shadow
mask technology.

20 56. A device comprising:

- a substrate with a device region;
- a sealing dam surrounding the device region;
- a cap supported by the sealing dam;

spacer particles fixed to a surface of the device region to support the cap;

a sealing region abutting an outer surface of the sealing dam; and

5 an adhesive located in the sealing region, the adhesive hermetically sealing the device, wherein the sealing dam reduces a sealing width of the device.

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